L1: Entry 1 of 2   File: JPAB   Sep 27, 1994

PUB-NO: JP406270609A
DOCUMENT-IDENTIFIER: JP 06270609 A
TITLE: PNEUMATIC TIRE

PUBN-DATE: September 27, 1994

INVENTOR-INFORMATION:
NAME   COUNTRY

SHINOHARA, KAZUAKI

ASSIGNEE-INFORMATION:
NAME   COUNTRY

BRIDGESTONE CORP

APPL-NO: JP05055841
APPL-DATE: March 16, 1993

INT-CL (IPC): B60C 11/04

ABSTRACT:

PURPOSE: To provide a pneumatic tire equipped with a tread pattern which can exert
a high wet operation performance under condition with low noise and high
maneuvering stability.

CONSTITUTION: A pneumatic concerned is equipped with a center circumferentially
running groove 1 in the central area of the tread and a number of center slant
groove groups positioned as pinching the center groove 1, wherein the pattern is
such that center ribs 6 and side lugs 7 are formed by arranging a number of
crosswise grooves 4, 5 which are in communication at one end with the center slant
grooves and extend in curvature from the central region to each side region.

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L1: Entry 2 of 2   .   File: DWPI   Sep 27, 1994

DERWENT-ACC-NO: 1994-346852
DERWENT-WEEK: 200128
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TITLE: tyre with improved wet performance - comprises centre ribs and side lugs in
tread, which are comparted by centre circumferential groove, side circumferential
grooves, centre inclined grooves, and crossing grooves

PATENT-ASSIGNEE:
ASSIGNEE ·   CODE
BRIDGESTONE CORP   BRID

PRIORITY-DATA: 1993JP-0055841 (March 16, 1993) ·

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PATENT-FAMILY:

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APPLICATION-DATA:

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JP 3162866B2		JP 6270609	Previous Publ.

INT-CL (IPC): B60C 11/04

ABSTRACTED-PUB-NO: JP 06270609A
BASIC-ABSTRACT:

In a pneumatic tyre, arranged in the tread centre are a centre circumferential
groove (1) which runs straight and a pair of centre inclined grooves (3); and
crossing grooves (4, 5) each of which joins to the centre inclined groove at one
end and open to the side wall at the other end, are arranged in the range from the
centre area to both side areas; thereby, the tread land comprises of a pair of
centre ribs (6) on both sides of the centre circumferential groove, which are
comparted by the centre inclined grooves, and side lugs (7) which are comparted by
the centre inclined grooves and crossing grooves.

The side lugs are blocks comparted by at least one side circumferential groove
which runs straight in both side areas close to the centre area.

ADVANTAGE - This tyre can improve the wet performance greatly while improving the pattern noise level and dry control stability.

CHOSEN-DRAWING: Dwg.0/5

TITLE-TERMS: TYRE IMPROVE WET PERFORMANCE COMPRISE CENTRE RIB SIDE LUG TREAD CENTRE CIRCUMFERENCE GROOVE SIDE CIRCUMFERENCE GROOVE CENTRE INCLINE GROOVE CROSS GROOVE

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

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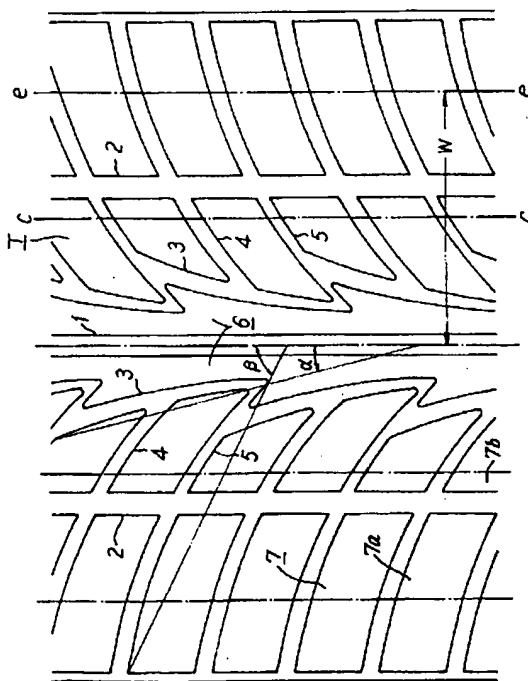(72)発明者　　篠原　一哲
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(54)【発明の名称】　空気入りタイヤ

(57)【要約】　　　　　（修正有）
【目的】　空気入りタイヤにおける高いウエット性能
を、低ノイズ並びに高い操縦安定性の下で実施し得るト
レッドパターンをもつ空気入りタイヤを提供すること。
【構成】　トレッドの中央域にセンタ周溝1とこれを挟
んで多数のセンタ斜溝群3をそなえ、センタ斜溝のおの
おのに一端で連通し中央域から両側域に、湾曲してのび
る横断溝4，5の多数配置にてセンタリブ6とサイドラ
グ7を形成したパターンをもつ空気入りタイヤ。

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【特許請求の範囲】

【請求項1】　一対のサイドウォール間にトロイド状をなしてまたがるクラウン部に路面と接するトレッドをそなえてこのトレッドには、タイヤの赤道面からトレッド半幅の1／2宛をへだてる周線外方の両側域に対し区画される中央域にて、トレッドのまわりに沿ってストレートに延びるセンタ周溝1と、このセンタ周溝1を挟みこれに面して互いに凸な小曲率にてセンタ周溝1に沿う間隔が漸変する斜めの断続排列の対よりなるセンタ斜溝3の群とを配置する一方、センタ斜溝3のおのおのに一端で連通し中央域から両側域にわたってサイドウォールの側方にて他端が開放する間に湾曲して延びる多数の横断溝4，5の群を配置して、センタ周溝1の両側にセンタ斜溝3の群にて区分された一対のセンタリブ6と、センタ斜溝3の群と横断溝4，5の群とによって区分された多数のサイドラグ7とからなるトレッド陸部を有することを特徴とする空気入りタイヤ。

【請求項2】　サイドラグ7が中央域に近接する両側域にてトレッドのまわりに沿ってストレートに延びる少なくとも1本宛のサイド周溝2により区分されたブロック7a，7b状である請求項1に記載した空気入りタイヤ。

【請求項3】　サイドラグ7がこれを区画する横断溝4，5に沿いラグ幅を事実上二等分してセンタ周溝1に達するまでの間にわたるサイプ8により細分されたものである請求項1又は2に記載した空気入りタイヤ。

【請求項4】　センタ斜溝3及び横断溝4，5の仮想上の延長が中央周溝1に収斂する溝配列による方向性パターンである請求項1，2又は3に記載した空気入りタイヤ。

【請求項5】　センタ斜溝3及び横断溝4，5の各溝端を連ねた線分よりなる弦のタイヤ赤道面に対する傾斜α，βがそれぞれ5〜30°，30〜90°である請求項1〜4の何れか一項に記載した空気入りタイヤ。

【発明の詳細な説明】

【0001】

【産業上の利用分野】高運動性能タイヤ、すなわち走行性能が最高水準に達するまで向上した高級高性能車両への装着供用に適合するように改善された空気入りタイヤにおいて、主要機能を犠牲にせずして高いウエット性能を実現するトレッドパターンについての抜本的構想を具体化した空気入りタイヤを提案しようとするものである。

【0002】

【従来の技術】直進走行時の安定性の向上及びパターンノイズの低減を両立するために、トレッド中央域にストレートリブを配置したパターンは一般的である。

【0003】またウエット性能のうち耐ハイドロプレーニング性を良くするには、例えば特開平4−19020号公報に示されているように溝面積（ネガティブ）を増

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やすことが一般的で、接地形状や接地圧の分布からとくに、トレッド中央域のネガティブを増やすのが効果的であることはすでに知られているとおりで、タイヤ走行中においてはトレッド中央域で接地圧が他の領域よりも高くかつ接地長さも長いからである。

【0004】

【発明が解決しようとする課題】通常の方向性の傾斜溝に加えてトレッド中央域にストレート主溝を配置することがウエット排水性の面で有効であるが、ノイズ低減と直進安定性を効果的ならしめるため、その両側にリブを配置すること、この場合においてリブの外側でのネガティブを増すことによって、ノイズ及び直進安定性を確保した上でさらにウエット性能が向上することが、発明者らの実験検討の結果知見された。そこで高いウエット性能を、他性能の犠牲を伴わずして有利に改善し得るトレッドパターンをもつ空気入りタイヤを与えることがこの発明の目的である。

【0005】

【課題を解決するための手段】本発明は、一対のサイドウォール間にトロイド状をなしてまたがるクラウン部に路面と接するトレッドをそなえてこのトレッドには、タイヤの赤道面からトレッド半幅の1／2宛をへだてる周線外方の両側域に対し区画される中央域にて、トレッドのまわりに沿ってストレートに延びるセンタ周溝1と、このセンタ周溝1を挟みこれに面して互いに凸ないし小曲率にてセンタ周溝1に沿う間隔が漸変する斜めの断続排列の対よりなるセンタ斜溝3の群とを配置する一方、センタ斜溝3のおのおのに一端で連通し中央域から両側域にわたってサイドウォールの側方にて他端が開放する間に湾曲して延びる多数の横断溝4，5の群を配置して、センタ周溝1の両側にセンタ斜溝3の群にて区分された一対のセンタリブ6と、センタ斜溝3の群と横断溝4，5の群とによって区分された多数のサイドラグ7とからなるトレッド陸部を有することを特徴とする空気入りタイヤであり、ここに、サイドラグ7が中央域に近接する両側域にてトレッドのまわりに沿ってストレートに延びる少なくとも1本宛のサイド周溝2により区分されたブロック7a，7b状であること、サイドラグ7がこれを区画する横断溝4，5に沿いラグ幅を事実上二等分してセンタ周溝1に達するまでの間にわたるサイプ8により細分されたものであること、センタ斜溝3及び横断溝4，5の仮想上の延長が中央周溝1に収斂する溝配列による方向性パターンであること、そしてセンタ斜溝3及び横断溝4，5の各溝端を連ねた線分よりなる弦のタイヤ赤道面に対する傾斜α，βがそれぞれ5〜30°，30〜90°であることが、好適である。

【0006】図1，2，3及び4に、この発明に基くトレッドパターンを例示した。これらのトレッドパターンが適用される、空気入りタイヤの基本構成は、一対のサイドウォールとこれらの間でトロイド状をなしてまたが

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るクラウン部とを、サイドウォール部内周縁のビード部に埋設されるビードコアのまわりに巻返し固着したコードのプライからなるラジアル構造のカーカスによって補強し、またクラウン部のまわりに通常その中央円周を含む平面に対し小角度で交る、相互平行排列コードの複数層の交差積層になるベルトの配置にて、クラウン部にそなえられるトレッドを補強してなり、さらにビード部のプライ端やクラウン部のベルト端ないしはその外周に適宜補強部材が配置され得るのは、あらためていうまでもないのでその構造の詳細についての図解を略し、パターンのみ要部の展開平面で図示した。

【0007】各図において図中1はセンタ周溝、2はサイド周溝、3はセンタ斜溝、4，5は横断溝であり、6はセンタ周溝とセンタ斜溝3の群とにより区分された一対のセンタリブ、7はセンタ斜溝3の群と横断溝4，5の群とにより区分されたサイドラグで7a，7bはサイドラグ7をサイド周溝2により分割して形成されるブロックである。センタリブ6とサイドラグ7とがトレッド陸部として機能する。

【0008】図1，2及び4において横断溝4，5は、センタ斜溝3の長さの中間点とセンタ溝1に近い始端からサイドウォールの側方に開放する終端の間にわたってのびるのに対し、図3で横断溝4，5がセンタ斜溝3の全長のほぼ1/3を溝端からそれぞれへだてる始端から同様に延伸するものとし、この場合センタ斜溝3は断続的な配列になるところ、互いに隣り合うセンタ斜溝3の始端と終端とを図示はしていないが連結溝により連通するようにしてもよい。

【0009】ここにトレッドTは図にあらわれていない一対のサイドウォール間にトロイド状をなしてまたがるクラウン部にて路面との接触を用意するものとし、その中央域というのはトレッドTの接地幅の1/2（以下"トレッド半幅"といい、Wで示す）のさらにほぼ1/2をタイヤ赤道からそれぞれ左右に隔てるトレッド円周c，c（図1参照）によって仮想的に区分される帯状領域を指し、その両側のトレッドTの幅端e，eに至るまでの両側域とともにトレッドTを形成する。トレッドTにはその中央域のまわりに沿ってストレートに延びるセンタ周溝1と、このセンタ周溝1を挟みこれに面して互いに凸な小曲率にてセンタ周溝に沿う間隔が漸変する斜めの断続排列の対よりなるセンタ斜溝3の群とを配置する一方センタ斜溝3のおのおのに一端で連通し、中央域から両側域にわたってサイドウォールの側方にて他端が開放する間に湾曲して延びる多数の横断溝4，5の群を配置する。図1～4において何れの場合もトレッド1の中央域に近接する両側域にてトレッド1のまわりに沿ってストレートに延びる少なくとも1本宛のサイド周溝2をそなえ、これによってサイドラグ7がブロック7aと7bとに区分されている。

【0010】図1，3の場合、センタ周溝1を挟んで各

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センタ斜溝2が互いちがいの千鳥排列をなすのに対し図2では左右に軸対称排列、また図4の例では点対称排列になる。図4に示すようにサイドラグ7がこれを区画する横断溝4，5に沿いラグ幅を二分してセンタ周溝1に達するまでの間にわたるサイプ8によって細分されたものとしてもよい。

【0011】上に述べたところにおいてセンタ斜溝3及び横断溝4，5の仮想上の延長が中央周溝1に収斂する溝配列による方向性パターンであり、またセンタ斜溝3及び横断溝4，5の何れも各溝端を連ねた線分よりなる弦のタイヤ赤道に対する傾斜α，βがそれぞれ5～30°，30～90°である。

【0012】

【作用】一般的な高性能系つまり偏平率が65％以下の空気入りタイヤのトレッドパターンにおいては、十分なウエット性能を維持するためにはトレッドのまわりにストレートにのびるセンタ周溝1とこれを挟んでセンタ斜溝3の群とを備えることが必要である。

【0013】接地形状や接地圧の分布から特にタイヤ中央区域の溝面積を増やすことが効果的であるため、トレッドTの中央域にてセンタ周溝1とセンタ斜溝3の群とを配置し、これに中央域から両側域に向かって連続して伸びトレッドTの面内の排水を可能とする横断溝4，5を組み合わせた構成が最も効果的である。この時、横断溝4，5を中央域のセンタ周溝1とつなげてしまうと、センタ周溝内をストレートに流れる水が横断溝の開口部によって乱流を起こし効率的に排水が行われないため、横断溝4，5に沿ってトレッド中央域から両側域部へ流れる水路をセンタ周溝1とは区分することが必要である。

【0014】一方、特に高速走行時の直進安定性を確保するためには、トレッドTの中央域にその円周に沿って伸びるストレートなセンタリブ6をもつことも必要で、これに上記したウエット排水を考慮してトレッドTの中央域にセンタ周溝1を配置してその両側にセンタリブを配置する。しかし、通常該リブは横方向の剛性を確保するためその外側を区分する周溝をトレッドTの中央域から離した位置に配置しなければならないが、その場合はリブを太くした分トレッド中央部の排水能力が低下する。

【0015】従って、センタ周溝1の両側リブの外側部にジグザグ状の周溝となるようにセンタ斜溝3の群を配置することによりリブの剛性を確保しつつ、かつネガティブをも確保することができ、より効率的なウエット性の実現が可能となる。特にトレッドTの中央域に傾斜角がかなり小さいセンタ斜溝3を備えることがウエット排水性において必要である。センタ斜溝3はストレート主溝の欠点である気柱共鳴によるノイズの低減にも効果的である。

【0016】ここに、ジグザグ状配列をなすセンタ斜溝

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3はセンタ周溝1の方に向かってタイヤの赤道方向に対する接線の角度が漸減する曲率をもつ曲線で形成することが、ウエット排水性に関しタイヤの回転による接地前方及び側方への排水の流線方向と一致し、好結果を生む。また、タイヤの赤道面に対し傾斜方向が互いに相反するいわゆる方向性をもたせることにより、その効果はより顕著となる。

【0017】

【実施例】タイヤの呼びPSR　225／50R16でトレッド幅2W：200㎜、接地長L：120㎜の諸元のタイヤにつきこの発明を次のように適用した。

【0018】発明パターンA（図1）

【表1】

	溝幅（mm）	溝角度（°）
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	4～7	0～20
横　断　溝　④	5～7	45～70
横　断　溝　⑤	2～7	45～70

【0019】発明パターンB（図2）

【表2】

	溝幅（mm）	溝角度（°）
センタ周溝　①	8	0
サイド周溝　②	9	5～15
センタ斜溝　③	4～7	0～20
横　断　溝　④	5～7	45～70
横　断　溝　⑤	2～7	45～70

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【0020】発明パターンC（図3）

【表3】

	溝幅（mm）	溝角度（°）
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	3～7	10～20
横　断　溝　④	4～7	40～70
横　断　溝　⑤	3～7	30～70

【0021】発明パターンD（図4）

【表4】

	溝幅（mm）	溝角度（°）
センタ周溝　①	9	0
サイド周溝　②	9	0
センタ斜溝　③	4～6	0～20
横　断　溝　④	5	70～90
横　断　溝　⑤	2～5	70～90

【0022】図5に示した従来パターンをもつ点でこの発明に比しパターン違いのみで他の構成は発明タイヤに同じに揃えた比較タイヤの成績を100とするウエットハイプレ性、パターンノイズ及びドライ操縦安定性のテスト結果は次表のとおりである。

【表5】

7　　　　　　　　　　　　　　　　　　　　　　8

	従来パターン	パターンA	パターンB	パターンC	パターンD
ウエットハイプレ	100	110	110	110	105
パターンノイズ	100	105	110	105	106
ドライ操縦安定性	100	105	105	105	103

テ ス ト 条 件：内圧2.0 kg／cm²、荷重実車2名乗車相当

ウツェットハイプレ：水深6mmのウエット路通過時の接地面の残存面積
（直線）　　　　の計測

パターンノイズ　：直線平滑路を100Km／hから惰行したときの
車内音のフィーリング評価

ドライ操縦安定性：ドライ状態のサーキットコースを各種走行モード
によりスポーツ走行したときのテストドライバー
のフィーリング評価

【0023】
【発明の効果】この発明によればパターンノイズ、ドライ操縦安定性の改善の下でのウエット性能の向上に著しく寄与し得る。
【図面の簡単な説明】
【図1】図1はこの発明の実施例を示すトレッドパターンの部分展開平面図、
【図2】図2は同じく他の実施例の同様な平面図、
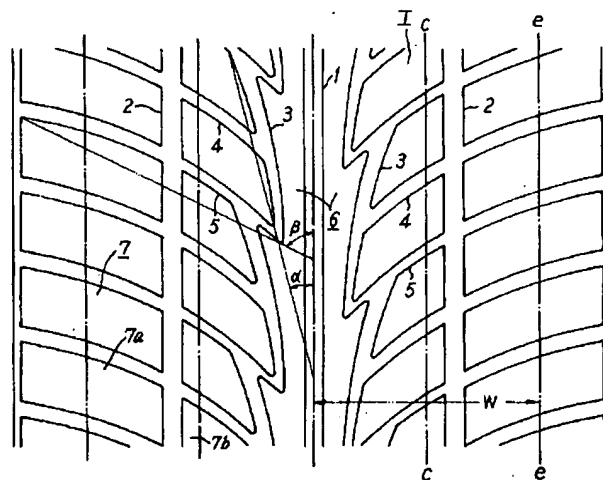【図3】図3は同じく別の実施例の同様な平面図、
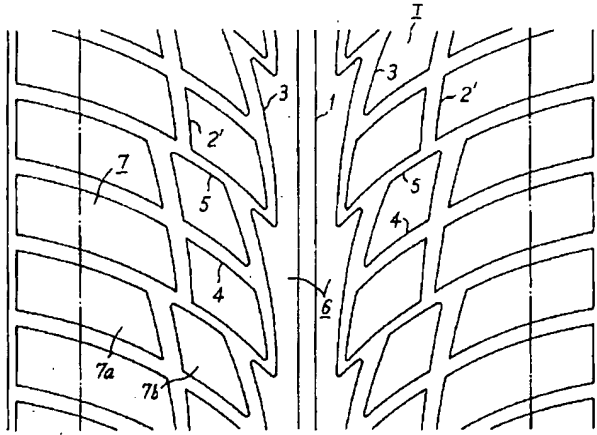【図4】図4は同じく変形実施例の同様な平面図、

＊【図5】図5は従来パターンの部分展開平面図である。
【符号の説明】
1　センタ周溝
2　サイド周溝
3　センタ斜溝
4　横断主溝
5　横断主溝
6　センタリブ
7　サイドラグ
＊30

【図1】

【図2】

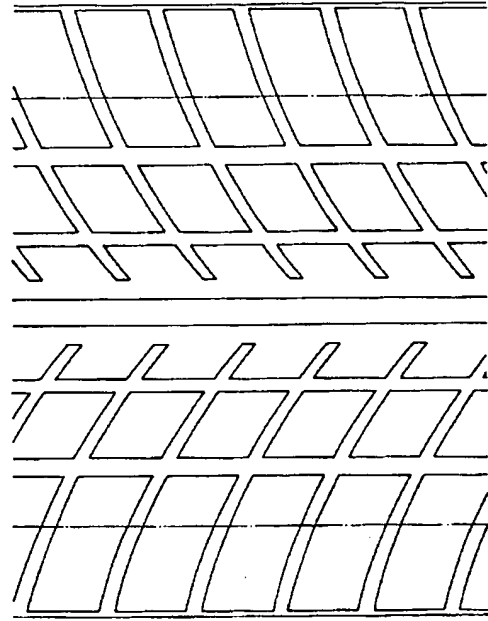
【図5】

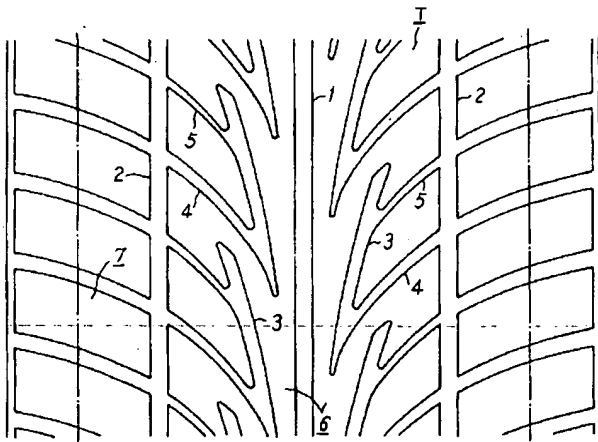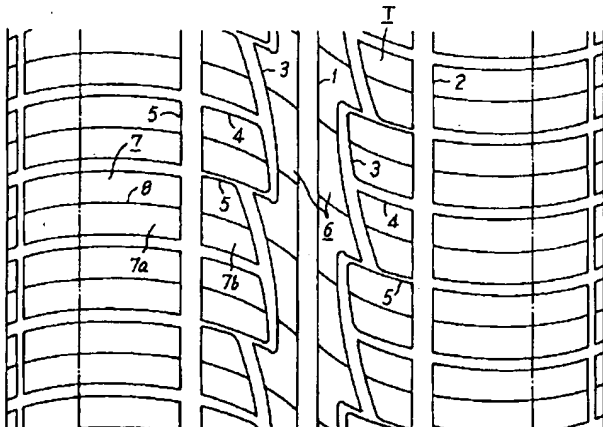【図3】

【図4】

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] wearing on the high-class high performance car which improved until the high movement engine-performance tire, i.e., performance-traverse ability, reached the highest level -- in the pneumatic tire improved so that access may be suited, it is going to propose the pneumatic tire which materialized the radical design about the tread pattern which does not sacrifice main functions, but carries out and realizes the high wet engine performance.
[0002]
[Description of the Prior Art] Since it is compatible in the improvement in the stability at the time of rectilinear-propagation transit, and reduction of a pattern noise, the pattern which has arranged the straight rib in the tread central region is common.
[0003] moreover, as it already being known that it is common to increase a groove surface product (negative) as shown in JP,4-19020,A, and it is effective to increase the negative of a tread central region especially from distribution of a touch-down configuration or ground pressure in order to improve hydroplaning-proof nature among wet engine performance -- it is -- under tire transit -- setting -- a tread central region -- the field of others [ground pressure] -- high -- and touch-down length -- it is because it is [as if] long.
[0004]
[Problem(s) to be Solved by the Invention] Although it is effective to arrange a straight major groove in a tread central region in addition to the inclination slot of the usual directivity in respect of wet wastewater nature If, in order to close noise reduction and rectilinear-propagation stability, arranging a rib on those both sides, and by increasing the negative in the outside of a rib in this case The knowledge of the wet engine performance improving further, after securing a noise and rectilinear-propagation stability was carried out as a result of experiment examination of artificers. Then, it is the purpose of this invention to give a pneumatic tire with the tread pattern which is not accompanied by the sacrifice of alterity ability, but carries out the high wet engine performance, and can be improved advantageously.
[0005]
[Means for Solving the Problem] This invention offers the tread which touches a road surface on the crown section which makes the shape of a toroid and straddles between the sidewalls of a pair. In this tread The center circumferential groove 1 straight prolonged along with the surroundings of a tread in the central region divided from the equatorial plane of a tire to the both-sides region of the method of the outside of the ******** circumference in 1/addressing to two of tread half width, While arranging the group of the center diagonal groove 3 to which spacing which faces this on both sides of this center circumferential groove 1, and meets the center circumferential groove 1 at a convex thru/or the rate of a short piece mutually changes gradually and which consists of a pair of slanting intermittence arrangement The group of the crossing slots 4 and 5 of a large number curved and prolonged while it is open for free passage by the end to each of the center diagonal groove 3 and the other end opens in the side of a sidewall ranging from the central region to a both-sides region is arranged. The center rib 6 of a

pair classified into the both sides of the center circumferential groove 1 by the group of the center diagonal groove 3, It is the pneumatic tire characterized by having the tread land part which consists of a side lug 7 of a large number classified by the group of the center diagonal groove 3, and the group of the crossing slots 4 and 5. It has the shape of block 7a classified by the side circumferential groove 2 of addressing to one at least to which the side lug 7 extends straight along with the surroundings of a tread here in the both-sides region close to a central region, and 7b, It is subdivided by SAIPU 8 over which it will go by the time the side lug 7 bisects lug width of face as a matter of fact along the crossing slots 4 and 5 which divide this and reaches the center circumferential groove 1, It is a directivity pattern by the slot array which the extension on imagination of the center diagonal groove 3 and the crossing slots 4 and 5 converges on the central circumferential groove 1, And it is suitable that the inclinations alpha and beta to the tire equatorial plane of the bowstring which consists of a segment which put each **** of the center diagonal groove 3 and the crossing slots 4 and 5 in a row are 5-30 degrees and 30-90 degrees, respectively.

[0006] The tread pattern based on this invention was illustrated to drawing 1 , and 2, 3 and 4. The basic configuration of a pneumatic tire to which these tread patterns are applied The crown section which makes the shape of a toroid and straddles between the sidewall of a pair, and these It reinforces with the carcass of the radial structure which consists of ply of the code which rolled back and fixed around the bead core laid under the toe of bead of a sidewall section inner circumference edge. Moreover, are mixed with the surroundings of the crown section by whenever [corniculus] to the flat surface which usually includes the central periphery. It comes to reinforce the tread offered on the crown section by arrangement of the belt which becomes the two or more layers intersection product layer of a mutual parallel arrangement code. Anew, since it was needless to say, that a reinforcement member may furthermore be arranged suitably at the ply edge of a toe of bead, the belt edge of the crown section, or its periphery omitted the illustration about the detail of the structure, and it illustrated only the pattern at the expansion flat surface of an important section.

[0007] In each drawing one in drawing a side circumferential groove and 3 for a center circumferential groove and 2 A center diagonal groove, 4 and 5 are crossing slots and 7a and 7b are blocks which divide the side lug 7 by the side circumferential groove 2, and are formed in the center rib of a pair with which 6 was classified by the group of a center circumferential groove and the center diagonal groove 3, and the side lug into which 7 was classified by the group of the center diagonal groove 3, and the group of the crossing slots 4 and 5. The center rib 6 and the side lug 7 function as a tread land part.

[0008] As opposed to the crossing slots 4 and 5 being extended over the termination opened to the side of a sidewall in drawing 1 , and 2 and 4 from the start edge near the midpoint and the center slot 1 on the die length of the center diagonal groove 3 drawing 3 -- the crossing slots 4 and 5 -- the overall length of the center diagonal groove 3 -- almost -- One third shall be similarly extended from the ****** start edge from Mizobata to each. In this case, center diagonal groove 3 Although illustration has not carried out the start edge and termination of the center diagonal groove 3 which adjoin each other mutually the place which becomes an intermittent array, you may make it open for free passage by the connection slot.

[0009] Contact on a road surface shall be prepared in the crown section which makes the shape of a toroid here and straddles it between the sidewalls of the pair by which Tread T is not appearing in drawing. The central region is 1/2 (it is called "tread half width" below) of the touch-down width of face of Tread T. W shows -- further -- about -- it is ** from the tire equator about one half at right and left, respectively -- Tread T is formed with a both-sides region until it points out the strip region classified virtually and results in **** e and e of the tread T of the both sides by the shining tread peripheries c and c (refer to drawing 1). The center circumferential groove 1 straight prolonged along with the surroundings of the central region in Tread T, While arranging the group of the center diagonal groove 3 to which spacing which faces this on both sides of this center circumferential groove 1, and meets a center circumferential groove at the **** rate of a short piece mutually changes gradually and which consists of a pair of slanting intermittence arrangement, are open for free passage by the end to each of the center diagonal groove 3. While the other end opens in the side of a sidewall ranging from the

central region to a both-sides region, the group of the crossing slots 4 and 5 of a large number curved and prolonged is arranged. The side circumferential groove 2 of addressing to one at least which extends straight along with the surroundings of a tread 1 in the both-sides region where the central region of a tread 1 is approached in drawing 1 -4 in any case is offered, and the side lug 7 is classified into Blocks 7a and 7b by this.

[0010] On both sides of the center circumferential groove 1, to making the alternate arrangement of each-other difference, in drawing 2 , it is influenced and, drawing 1 and in the case of 3, each center diagonal groove 2 is point symmetry arrangement in axial symmetry arrangement and the example of drawing 4 . It is good also as what was subdivided by SAIPU 8 over which it will go by the time the side lug 7 bisects lug width of face along the crossing slots 4 and 5 which divide this and reaches the center circumferential groove 1, as shown in drawing 4 .

[0011] It is a directivity pattern by the slot array which the extension on imagination of the center diagonal groove 3 and the crossing slots 4 and 5 converges on the central circumferential groove 1 at the place described above, and the inclinations alpha and beta to the tire equator of the bowstring which consists of a segment to which both the center diagonal groove 3 and the crossing slots 4 and 5 put each **** in a row are 5-30 degrees and 30-90 degrees, respectively.

[0012]

[Function] In order to maintain sufficient wet engine performance in the tread pattern of 65% or less of pneumatic tire, general high performance system, i.e., oblateness, it is required to equip the surroundings of a tread with the group of the center diagonal groove 3 on both sides of the center circumferential groove 1 and this which are extended straight.

[0013] Since it is effective to increase the groove surface product of a tire central area especially from distribution of a touch-down configuration or ground pressure, the configuration which combined the crossing slots 4 and 5 which arrange the group of the center circumferential groove 1 and the center diagonal groove 3 in the central region of Tread T, and enable wastewater within the field of the elongation tread T continuously toward a both-sides region at this from a central region is the most effective. If the crossing slots 4 and 5 are connected with the center circumferential groove 1 of a central region at this time, it is required for the center circumferential groove 1 to classify the channel where the water which flows the inside of a center circumferential groove straight flows from a tread central region to both the lateral area section along the crossing slots 4 and 5 since wastewater is not performed on a lifting effectiveness target-by-opening-of-a-crossing slot in a turbulent-flow.

[0014] On the other hand, in order to secure the rectilinear-propagation stability at the time of high-speed transit especially, it is also required for the central region of Tread T to have the straight center rib 6 extended in accordance with the periphery, in consideration of the wet wastewater described above to this, the center circumferential groove 1 is arranged in the central region of Tread T, and a center rib is arranged on the both sides. However, although this rib must arrange the circumferential groove which classifies the outside in the location separated from the central region of Tread T in order to secure lateral rigidity, the wastewater capacity of the part tread center section which made the rib thick in that case usually declines.

[0015] Therefore, securing the rigidity of a rib by arranging the group of the center diagonal groove 3 so that it may become the lateral part of the both-sides rib of the center circumferential groove 1 with a zigzag-like circumferential groove, a negative can also be secured and it becomes realizable [more efficient wet nature]. It is required for especially the central region of Tread T in wet wastewater nature to have the center diagonal groove 3 with a quite small tilt angle. The center diagonal groove 3 is effective also for reduction of the noise by the air column resonance which is the fault of a straight major groove.

[0016] Forming the center diagonal groove 3 which makes a zigzag-like array here with a curve with the curvature which the include angle of the tangent to the direction of the equator of a tire dwindles toward the direction of the center circumferential groove 1 induces a good result about wet wastewater nature in accordance with the direction of an elementary stream of the wastewater to the touch-down front and the side by rotation of a tire. Moreover, the effectiveness becomes more remarkable by giving the so-called

directivity with which the inclination direction disagrees mutually to the equatorial plane of a tire.
[0017]
[Example] Call PSR of a tire Lessons was taken from the tire of the item of tread width-of-face 2W:200mm and L:120mm of touch-down length by 225 / 50R16, and this invention was applied as follows.
[0018] Invention pattern A (drawing 1)
[Table 1]

	溝幅 （mm)	溝角度(°)
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	4 〜 7	0 〜20
横　断　溝　④	5 〜 7	45〜70
横　断　溝　⑤	2 〜 7	45〜70

[0019] Invention pattern B (drawing 2)
[Table 2]

	溝幅 （mm)	溝角度(°)
センタ周溝 , ①	8	0
サイド周溝 ②	9	5 〜15
センタ斜溝　③	4 〜 7	0 〜20
横　断　溝　④	5 〜 7	45〜70
横　断　溝　⑤	2 〜7	45〜70

[0020] Invention pattern C (drawing 3)
[Table 3]

	溝幅 （mm)	溝角度(°)
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	3 〜 7	10〜20
横　断　溝　④	4 〜 7	40〜70
横　断　溝　⑤	3 〜 7	30〜70

[0021] Invention pattern D (drawing 4)
[Table 4]

	溝幅（mm）	溝角度（°）
センタ周溝　①	9	0
サイド周溝　②	9	0
センタ斜溝　③	4〜6	0〜20
横　断　溝　④	5	70〜90
横　断　溝　⑤	2〜5	70〜90

[0022] The test result of the wet high pre nature which sets to 100 the results of the comparison tire which compared with this invention and arranged other configurations similarly to an invention tire only by the pattern difference with the point which has a pattern conventionally which was shown in drawing 5 , a pattern noise, and dry driving stability is as in degree table.
[Table 5]

	従来パターン	パターンA	パターンB	パターンC	パターンD
ウエットハイプレ	100	110	110	110	105
パターンノイズ	100	105	110	105	106
ドライ操縦安定性	100	105	105	105	103

テ ス ト 条 件：内圧2.0 kg／cm²、荷重実車 2 名乗車相当

ウェットハイプレ：水深 6 mmのウエット路通過時の接地面の残存面積

　（直線）　　　　の計測

パターンノイズ　：直線平滑路を 1 0 0 Km／hから惰行したときの

　　　　　　　　　車内音のフィーリング評価

ドライ操縦安定性：ドライ状態のサーキットコースを各種走行モード

　　　　　　　　　によりスポーツ走行したときのテストドライバー

　　　　　　　　　のフィーリング評価

[0023]
[Effect of the Invention] According to this invention, it can contribute to improvement in the wet engine performance under an improvement of a pattern noise and dry driving stability remarkably.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] wearing on the high-class high performance car which improved until the high movement engine-performance tire, i.e., performance-traverse ability, reached the highest level -- in the pneumatic tire improved so that access may be suited, it is going to propose the pneumatic tire which materialized the radical design about the tread pattern which does not sacrifice main functions, but carries out and realizes the high wet engine performance.
[0002]
[Description of the Prior Art] Since it is compatible in the improvement in the stability at the time of rectilinear-propagation transit, and reduction of a pattern noise, the pattern which has arranged the straight rib in the tread central region is common.
[0003] moreover, as it already being known that it is common to increase a groove surface product (negative) as shown in JP,4-19020,A, and it is effective to increase the negative of a tread central region especially from distribution of a touch-down configuration or ground pressure in order to improve hydroplaning-proof nature among wet engine performance -- it is -- under tire transit -- setting -- a tread central region -- the field of others [ground pressure] -- high -- and touch-down length -- it is because it is [as if] long.
[0004]
[Problem(s) to be Solved by the Invention] Although it is effective to arrange a straight major groove in a tread central region in addition to the inclination slot of the usual directivity in respect of wet wastewater nature If, in order to close noise reduction and rectilinear-propagation stability, arranging a rib on those both sides, and by increasing the negative in the outside of a rib in this case The knowledge of the wet engine performance improving further, after securing a noise and rectilinear-propagation stability was carried out as a result of experiment examination of artificers. Then, it is the purpose of this invention to give a pneumatic tire with the tread pattern which is not accompanied by the sacrifice of alterity ability, but carries out the high wet engine performance, and can be improved advantageously.
[0005]
[Means for Solving the Problem] This invention offers the tread which touches a road surface on the crown section which makes the shape of a toroid and straddles between the sidewalls of a pair. In this tread The center circumferential groove 1 straight prolonged along with the surroundings of a tread in the central region divided from the equatorial plane of a tire to the both-sides region of the method of the outside of the ******** circumference in 1/addressing to two of tread half width, While arranging the group of the center diagonal groove 3 to which spacing which faces this on both sides of this center circumferential groove 1, and meets the center circumferential groove 1 at a convex thru/or the rate of a short piece mutually changes gradually and which consists of a pair of slanting intermittence arrangement The group of the crossing slots 4 and 5 of a large number curved and prolonged while it is open for free passage by the end to each of the center diagonal groove 3 and the other end opens in the side of a sidewall ranging from the central region to a both-sides region is arranged. The center rib 6 of a

pair classified into the both sides of the center circumferential groove 1 by the group of the center diagonal groove 3, It is the pneumatic tire characterized by having the tread land part which consists of a side lug 7 of a large number classified by the group of the center diagonal groove 3, and the group of the crossing slots 4 and 5. It has the shape of block 7a classified by the side circumferential groove 2 of addressing to one at least to which the side lug 7 extends straight along with the surroundings of a tread here in the both-sides region close to a central region, and 7b, It is subdivided by SAIPU 8 over which it will go by the time the side lug 7 bisects lug width of face as a matter of fact along the crossing slots 4 and 5 which divide this and reaches the center circumferential groove 1, It is a directivity pattern by the slot array which the extension on imagination of the center diagonal groove 3 and the crossing slots 4 and 5 converges on the central circumferential groove 1, And it is suitable that the inclinations alpha and beta to the tire equatorial plane of the bowstring which consists of a segment which put each **** of the center diagonal groove 3 and the crossing slots 4 and 5 in a row are 5-30 degrees and 30-90 degrees, respectively.

[0006] The tread pattern based on this invention was illustrated to <u>drawing 1</u> , and 2, 3 and 4. The basic configuration of a pneumatic tire to which these tread patterns are applied The crown section which makes the shape of a toroid and straddles between the sidewall of a pair, and these It reinforces with the carcass of the radial structure which consists of ply of the code which rolled back and fixed around the bead core laid under the toe of bead of a sidewall section inner circumference edge. Moreover, are mixed with the surroundings of the crown section by whenever [corniculus] to the flat surface which usually includes the central periphery. It comes to reinforce the tread offered on the crown section by arrangement of the belt which becomes the two or more layers intersection product layer of a mutual parallel arrangement code. Anew, since it was needless to say, that a reinforcement member may furthermore be arranged suitably at the ply edge of a toe of bead, the belt edge of the crown section, or its periphery omitted the illustration about the detail of the structure, and it illustrated only the pattern at the expansion flat surface of an important section.

[0007] In each drawing one in drawing a side circumferential groove and 3 for a center circumferential groove and 2 A center diagonal groove, 4 and 5 are crossing slots and 7a and 7b are blocks which divide the side lug 7 by the side circumferential groove 2, and are formed in the center rib of a pair with which 6 was classified by the group of a center circumferential groove and the center diagonal groove 3, and the side lug into which 7 was classified by the group of the center diagonal groove 3, and the group of the crossing slots 4 and 5. The center rib 6 and the side lug 7 function as a tread land part.

[0008] As opposed to the crossing slots 4 and 5 being extended over the termination opened to the side of a sidewall in <u>drawing 1</u> , and 2 and 4 from the start edge near the midpoint and the center slot 1 on the die length of the center diagonal groove 3 <u>drawing 3</u> -- the crossing slots 4 and 5 -- the overall length of the center diagonal groove 3 -- almost -- One third shall be similarly extended from the ****** start edge from Mizobata to each. In this case, center diagonal groove 3 Although illustration has not carried out the start edge and termination of the center diagonal groove 3 which adjoin each other mutually the place which becomes an intermittent array, you may make it open for free passage by the connection slot.

[0009] Contact on a road surface shall be prepared in the crown section which makes the shape of a toroid here and straddles it between the sidewalls of the pair by which Tread T is not appearing in drawing. The central region is 1/2 (it is called "tread half width" below) of the touch-down width of face of Tread T. W shows -- further -- about -- it is ** from the tire equator about one half at right and left, respectively -- Tread T is formed with a both-sides region until it points out the strip region classified virtually and results in **** e and e of the tread T of the both sides by the shining tread peripheries c and c (refer to <u>drawing 1</u>). The center circumferential groove 1 straight prolonged along with the surroundings of the central region in Tread T, While arranging the group of the center diagonal groove 3 to which spacing which faces this on both sides of this center circumferential groove 1, and meets a center circumferential groove at the **** rate of a short piece mutually changes gradually and which consists of a pair of slanting intermittence arrangement, are open for free passage by the end to each of the center diagonal groove 3. While the other end opens in the side of a sidewall ranging from the

central region to a both-sides region, the group of the crossing slots 4 and 5 of a large number curved and prolonged is arranged. The side circumferential groove 2 of addressing to one at least which extends straight along with the surroundings of a tread 1 in the both-sides region where the central region of a tread 1 is approached in drawing 1 -4 in any case is offered, and the side lug 7 is classified into Blocks 7a and 7b by this.

[0010] On both sides of the center circumferential groove 1, to making the alternate arrangement of each-other difference, in drawing 2 , it is influenced and, drawing 1 and in the case of 3, each center diagonal groove 2 is point symmetry arrangement in axial symmetry arrangement and the example of drawing 4 . It is good also as what was subdivided by SAIPU 8 over which it will go by the time the side lug 7 bisects lug width of face along the crossing slots 4 and 5 which divide this and reaches the center circumferential groove 1, as shown in drawing 4 .

[0011] It is a directivity pattern by the slot array which the extension on imagination of the center diagonal groove 3 and the crossing slots 4 and 5 converges on the central circumferential groove 1 at the place described above, and the inclinations alpha and beta to the tire equator of the bowstring which consists of a segment to which both the center diagonal groove 3 and the crossing slots 4 and 5 put each **** in a row are 5-30 degrees and 30-90 degrees, respectively.

[0012]

[Function] In order to maintain sufficient wet engine performance in the tread pattern of 65% or less of pneumatic tire, general high performance system, i.e., oblateness, it is required to equip the surroundings of a tread with the group of the center diagonal groove 3 on both sides of the center circumferential groove 1 and this which are extended straight.

[0013] Since it is effective to increase the groove surface product of a tire central area especially from distribution of a touch-down configuration or ground pressure, the configuration which combined the crossing slots 4 and 5 which arrange the group of the center circumferential groove 1 and the center diagonal groove 3 in the central region of Tread T, and enable wastewater within the field of the elongation tread T continuously toward a both-sides region at this from a central region is the most effective. If the crossing slots 4 and 5 are connected with the center circumferential groove 1 of a central region at this time, it is required for the center circumferential groove 1 to classify the channel where the water which flows the inside of a center circumferential groove straight flows from a tread central region to both the lateral area section along the crossing slots 4 and 5 since wastewater is not performed on a lifting-effectiveness-target-by-opening of a crossing slot in a turbulent flow.

[0014] On the other hand, in order to secure the rectilinear-propagation stability at the time of high-speed transit especially, it is also required for the central region of Tread T to have the straight center rib 6 extended in accordance with the periphery, in consideration of the wet wastewater described above to this, the center circumferential groove 1 is arranged in the central region of Tread T, and a center rib is arranged on the both sides. However, although this rib must arrange the circumferential groove which classifies the outside in the location separated from the central region of Tread T in order to secure lateral rigidity, the wastewater capacity of the part tread center section which made the rib thick in that case usually declines.

[0015] Therefore, securing the rigidity of a rib by arranging the group of the center diagonal groove 3 so that it may become the lateral part of the both-sides rib of the center circumferential groove 1 with a zigzag-like circumferential groove, a negative can also be secured and it becomes realizable [more efficient wet nature]. It is required for especially the central region of Tread T in wet wastewater nature to have the center diagonal groove 3 with a quite small tilt angle. The center diagonal groove 3 is effective also for reduction of the noise by the air column resonance which is the fault of a straight major groove.

[0016] Forming the center diagonal groove 3 which makes a zigzag-like array here with a curve with the curvature which the include angle of the tangent to the direction of the equator of a tire dwindles toward the direction of the center circumferential groove 1 induces a good result about wet wastewater nature in accordance with the direction of an elementary stream of the wastewater to the touch-down front and the side by rotation of a tire. Moreover, the effectiveness becomes more remarkable by giving the so-called

directivity with which the inclination direction disagrees mutually to the equatorial plane of a tire.
[0017]
[Example] Call PSR of a tire Lessons was taken from the tire of the item of tread width-of-face
2W:200mm and L:120mm of touch-down length by 225 / 50R16, and this invention was applied as
follows.
[0018] Invention pattern A (drawing 1)
[Table 1]

	溝幅 （mm)	溝角度(°)
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	4～7	0～20
横　断　溝　④	5～7	45～70
横　断　溝　⑤	2～7、	45～70

[0019] Invention pattern B (drawing 2)
[Table 2]

	溝幅 （mm)	溝角度(°)
センタ周溝　①	8	0
サイド周溝　②	9	5～15
センタ斜溝　③	4～7	0～20
横　断　溝　④	5～7	45～70
横　断　溝　⑤	2～7	45～70

[0020] Invention pattern C (drawing 3)
[Table 3]

	溝幅 （mm)	溝角度(°)
センタ周溝　①	8	0
サイド周溝　②	9	0
センタ斜溝　③	3～7	10～20
横　断　溝　④	4～7	40～70
横　断　溝　⑤	3～7	30～70

[0021] Invention pattern D (drawing 4)
[Table 4]

	溝幅（mm）	溝角度（°）
センタ周溝　①	9	0
サイド周溝　②	9	0
センタ斜溝　③	4〜6	0〜20
横　断　溝　④	5	70〜90
横　断　溝　⑤	2〜5	70〜90

[0022] The test result of the wet high pre nature which sets to 100 the results of the comparison tire which compared with this invention and arranged other configurations similarly to an invention tire only by the pattern difference with the point which has a pattern conventionally which was shown in underline drawing 5, a pattern noise, and dry driving stability is as in degree table.

[Table 5]

	従来パターン	パターンA	パターンB	パターンC	パターンD
ウエットハイプレ	100	110	110	110	105
パターンノイズ	100	105	110	105	106
ドライ操縦安定性	100	105	105	105	103

テスト条件：内圧2.0 kg／cm²、荷重実車2名乗車相当

ウツェトハイプレ：水深6mmのウエット路通過時の接地面の残存面積
　（直線）　　　の計測

パターンノイズ　：直線平滑路を100Km／hから惰行したときの
　　　　　　　　車内音のフィーリング評価

ドライ操縦安定性：ドライ状態のサーキットコースを各種走行モード
　　　　　　　　によりスポーツ走行したときのテストドライバー
　　　　　　　　のフィーリング評価

[0023]
[Effect of the Invention] According to this invention, it can contribute to improvement in the wet engine performance under an improvement of a pattern noise and dry driving stability remarkably.

[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The tread which touches a road surface is offered on the crown section which makes the shape of a toroid and straddles between the sidewalls of a pair. In this tread The center circumferential groove 1 straight prolonged along with the surroundings of a tread in the central region divided from the equatorial plane of a tire to the both-sides region of the method of the outside of the ******** circumference in 1/addressing to two of tread half width, While arranging the group of the center diagonal groove 3 to which spacing which faces this on both sides of this center circumferential groove 1, and meets the center circumferential groove 1 at the **** rate of a short piece mutually changes gradually and which consists of a pair of slanting intermittence arrangement The group of the crossing slots 4 and 5 of a large number curved and prolonged while it is open for free passage by the end to each of the center diagonal groove 3 and the other end opens in the side of a sidewall ranging from the central region to a both-sides region is arranged. The pneumatic tire characterized by having the tread land part which consists of a side lug 7 of a large number classified by the center rib 6 of a pair classified into the both sides of the center circumferential groove 1 by the group of the center diagonal groove 3, and the group of the center diagonal groove 3 and the group of the crossing slots 4 and 5.
[Claim 2] The pneumatic tire indicated to claim 1 which has the shape of block 7a classified by the side circumferential groove 2 of addressing to one at least to which the side lug 7 extends straight along with the surroundings of a tread in the both-sides region close to a central region, and 7b.
[Claim 3] The pneumatic tire indicated to claim 1 subdivided by SAIPU 8 over which it will go by the time the side lug 7 bisects lug width of face as a matter of fact along the crossing slots 4 and 5 which divide this and reaches the center circumferential groove 1, or 2.
[Claim 4] The pneumatic tire indicated to claims 1 and 2 which are the directivity patterns by the slot array which the extension on imagination of the center diagonal groove 3 and the crossing slots 4 and 5 converges on the central circumferential groove 1, or 3.
[Claim 5] The pneumatic tire indicated in any 1 term of claims 1-4 whose inclinations alpha and beta to the tire equatorial plane of the bowstring which consists of a segment which put each **** of the center diagonal groove 3 and the crossing slots 4 and 5 in a row are 5-30 degrees and 30-90 degrees, respectively.

[Translation done.]